

Applicants: TAY, Cheng Siew et al.
Serial No.: 10/735,638
Filed: December 16, 2003
Page 2

IN THE CLAIMS

This listing of claims will replace all prior versions and listing of claims in the Application.

Listing of Claims

1. **(Previously Presented)** A printed circuit board comprising:
pads suitable to be soldered to respective solder-balls of a device, where a perimeter of a pad has a crack initiation point at a location where cracks in a solder-ball are anticipated to start after said solder-ball is soldered to said pad, and where said pad merges with a trace along a portion of said perimeter that does not include a vicinity of said crack initiation point, wherein said portion is not longer than the length of one quarter of said perimeter.
2. **(Original)** The printed circuit board of claim 1, wherin at least one of said pads is a metal-defined pad.
3. **(Original)** The printed circuit board of claim 1, wherin at least one of said pads is a solder-mask-defined pad.
4. **(Original)** The printed circuit board of claim 1, wherin at least one of said pads is substantially round.
5. **(Cancelled)**
6. **(Previously Presented)** The printed circuit board of claim 1, wherein said pad is substantially round and a tangent to said perimeter at a middle point of said portion is substantially parallel to a crack propagation direction for said solder-ball.
7. **(Original)** The printed circuit board of claim 1, wherein a straight line joining said crack initiation point and a middle point of said portion is parallel to a crack propagation direction for said solder-ball.
8. **(Original)** A printed circuit board comprising:

Applicants: TAY, Cheng Siew et al.
Serial No.: 10/735,638
Filed: December 16, 2003
Page 3

pads suitable to be soldered to respective solder-balls of a device, said pads having microvias located therein, where a center of a microvia of a pad is farther than a center of said pad from a crack initiation point located on a perimeter of said pad at a location where cracks in a solder-ball are anticipated to start after said solder-ball is soldered to said pad.

9. (Original) The printed circuit board of claim 8, wherein at least one of said pads is a metal-defined pad.
10. (Original) The printed circuit board of claim 8, wherein at least one of said pads is a solder-mask-defined pad.
11. (Original) The printed circuit board of claim 8, wherein at least one of said pads is substantially round.
12. (Original) The printed circuit board of claim 8, wherein at least one point of the perimeter of said microvia is located on the perimeter of said pad.
13. (Original) The printed circuit board of claim 11, wherein a straight line joining said crack initiation point and said center of said microvia is parallel to the projection onto the pad of the crack propagation direction for said solder-ball.
14. (Original) The printed circuit board of claim 13, wherein at least one point of the perimeter of said microvia is located on the perimeter of said pad.
15. (Original) A printed circuit board having a device installed thereon, the printed circuit board comprising:
pads soldered to respective solder-balls of said device, said pads having microvias located therein, where a center of a microvia of a pad is farther than a center of said pad from a crack initiation point located on a perimeter of said pad at a location where cracks in a solder-ball are anticipated to start after said solder-ball is soldered to said pad,
wherein said printed circuit board has a voltage monitor installed thereon.

Applicants: TAY, Cheng Siew et al.
Serial No.: 10/735,638
Filed: December 16, 2003
Page 4

16. (Original) The printed circuit board of claim 15, wherein at least one of said pads is a metal-defined pad.
17. (Original) The printed circuit board of claim 15, wherein said printed circuit board is a motherboard.
18. (Previously Presented) A printed circuit board having a device installed thereon, the printed circuit board comprising:
pads soldered to respective solder-balls of said device, where a perimeter of a pad has a crack initiation point at a location where cracks in a solder-ball are anticipated to start after said solder-ball is soldered to said pad, and where said pad merges with a respective trace along a portion of said perimeter that does not include a vicinity of said crack initiation point, wherein said portion is not longer than the length of one quarter of said perimeter, and
wherein said printed circuit board has a voltage monitor installed thereon.
19. (Original) The printed circuit board of claim 18, wherein at least one of said pads is a metal-defined pad.
20. (Original) The printed circuit board of claim 18, wherein said printed circuit board is a motherboard.
21. (Withdrawn) An apparatus comprising:
an audio input device; and
a printed circuit board having a device installed thereon, said printed circuit board including at least:
pads soldered to respective solder-balls of said device, said pads having microvias located therein, where a center of a microvia of a pad is farther than a center of said pad from a crack initiation point located on a perimeter of said pad at a location where cracks in a solder-ball are anticipated to start after said solder-ball is soldered to said pad.
22. (Withdrawn) The apparatus of claim 21, wherein said printed circuit board is a motherboard.

Applicants: TAY, Cheng Siew et al.
Serial No.: 10/735,638
Filed: December 16, 2003
Page 5

23. (Withdrawn) The apparatus of claim 21, wherein said apparatus is a computer.
24. (Withdrawn) An apparatus comprising:
an audio input device; and
a printed circuit board having a device installed thereon, said printed circuit board including at least:
pads soldered to respective solder-balls of said device, where a perimeter of a pad has a crack initiation point at a location where cracks in a solder-ball are anticipated to start after said solder-ball is soldered to said pad, and where said pad merges with a respective trace along a portion of said perimeter that does not include a vicinity of said crack initiation point.
25. (Withdrawn) The apparatus of claim 24, wherein said printed circuit board is a motherboard.
26. (Withdrawn) The apparatus of claim 24, wherein said apparatus is a computer.
27. (Withdrawn) A method comprising:
for a pad of a printed circuit board that is suitable to be soldered to a respective solder-ball of a particular device:
identifying a crack initiation point on a perimeter of said pad at a location where cracks in said solder-ball are anticipated to start after said solder-ball is soldered to said pad; and
instructing software that a trace routed to said pad is not to merge with said pad at a part of said perimeter that includes said crack initiation point.
28. (Withdrawn) The method of claim 27, wherein said pad is substantially round and instructing said software comprises:
instructing said software that said trace is to merge with said pad at a portion of said perimeter for which a normal to said perimeter at a middle point of said portion is substantially parallel to a crack propagation direction for said solder-ball.

Applicants: TAY, Cheng Sicw et al.
Serial No.: 10/735,638
Filed: December 16, 2003
Page 6

29. (Withdrawn) The method of claim 27, wherein said pad is substantially round and instructing said software comprises:
instructing said software that said trace is to merge with said pad within a portion of said perimeter that begins at a first point for which a first normal to said perimeter is substantially parallel to a crack propagation direction for said solder-ball and ends at a second point for which a second normal to said perimeter is substantially parallel to said crack propagation direction for said solder-ball.
30. (Withdrawn) A method comprising:
for a pad of a printed circuit board that is suitable to be soldered to a respective solder-ball of a particular device:
identifying a crack initiation point on a perimeter of said pad at a location where cracks in said solder-ball are anticipated to start after said solder-ball is soldered to said pad; and
instructing software that a center of a microvia of said pad is to be located farther than a center of said pad from said crack initiation point.
31. (Withdrawn) The method of claim 30, wherein instructing said software comprises:
instructing said software that said center of said microvia is to be located substantially on a line starting at said crack initiation point and parallel to a crack propagation direction for said solder-ball.
32. (Withdrawn) The method of claim 31, wherein instructing said software comprises:
instructing said software that at least one point of a perimeter of said microvia is to be located on a perimeter of said pad.
33. (Withdrawn) An article comprising a storage medium having stored thereon instructions that, when executed by a computing platform, result in: generating one or more files for manufacturing a printed circuit board, where generating said one or more files comprises:

Applicants: TAY, Cheng Siew et al.
Serial No.: 10/735,638
Filed: December 16, 2003
Page 7

ensuring that a pad of said printed circuit board that is suitable to be soldered to a respective solder-ball of a device merges with a respective trace along a portion of a perimeter of said pad, wherein said portion does not include a vicinity of a crack initiation point, and said crack initiation point is located on said perimeter at a location where cracks in said solder-ball are anticipated to start after said solder-ball is soldered to said pad.

34. (Withdrawn) The article of claim 33, wherein generating said one or more files comprises ensuring that said pad is substantially round.
35. (Withdrawn) The article of claim 34, wherein ensuring that said pad merges with said trace along said portion includes ensuring that a normal to a middle point of said portion is substantially parallel to a crack propagation direction for said solder-ball.
36. (Withdrawn) An article comprising a storage medium having stored thereon instructions that, when executed by a computing platform, result in:
generating one or more files for manufacturing a printed circuit board, wherein generating said one or more files comprises:
ensuring that for a pad of said printed circuit board that is suitable to be soldered to a respective solder-ball of a device and has a microvia located therein, a center of said microvia is farther than a center of said pad from a crack initiation point located on a perimeter of said pad at a location where cracks in said solder-ball are anticipated to start after said solder-ball is soldered to said pad.
37. (Withdrawn) The article of claim 36, wherein generating said one or more files further comprises ensuring that said center of said microvia is located substantially on a line starting at said crack initiation point and parallel to a crack propagation direction for said solder-ball.

Applicants: TAY, Cheng Siew et al.
Serial No.: 10/735,638
Filed: December 16, 2003
Page 8

38. (Withdrawn) The article of claim 37, wherein generating said one or more filcs further comprises ensuring that at least one point of a perimeter of said microvia is located on a perimeter of said pad.